

경피적 신루재설치술 시 발생한 신정맥파열

송필현, 고영휘, 옥봉기, 김영욱, 이권수, 권대현, 김현태¹, 박신률², 정희창

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Renal Venous Perforation during Reinsertion of a Percutaneous Nephrostomy Catheter

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While the sustainment of percutaneous nephrostomy with regular change in chronic un-operable cases is widely performed for relief of urinary obstructions, performance of the blind procedure without fluoroscopic monitoring could result in clinical disaster. We report on a case of direct renal vein injury by mis-guidance of a nephrostomy catheter, which was successfully managed conservatively by serial venography monitoring combined with intensive conservative treatment. To the best of our knowledge, this is the first report on management of a renal vein injury during the percutaneous nephrostomy.

Keywords: Percutaneous nephrostomy; Renal veins; Phlebography

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Percutaneous nephrostomy (PCN) is widely performed transiently or permanently in patients with surgically uncorrectable obstructive uropathy or postrenal renal failure.¹ In permanent case, a regular replacement of nephrostomy catheter is imperative to prevent potential complications including urinary tract infection, obstruction, and stone formation. Usually, the catheter change was performed under the guidance of fluoroscopic image, and a concomitant use of ultrasonography or computed tomography (CT) is also beneficial for locating a nephrostomy catheter within the renal pelvis.² However, in patient with chronic maintenance of PCN, the route of nephrostomy

was tend to be well matured, making the changing procedure easy. Considering periodic radiation exposure and financial expense, an attempt to change the catheter by sole usage of guidewire was made, resulting in a clinical disaster. Though urgent vascular surgery may remain a treatment of choice, conservative treatment using sufficient supportive care can be an alternative option, in selected case with severe medical co-morbidities. This brief report depicts the clinical course of renal venous tearing which was successfully managed by conservative approach using venography monitoring.



Fig. 1. A renal computed tomography image taken 6 hours after the percutaneous nephrostomy change showed the nephrostomy catheter located in left renal vein.

CASE REPORT

An 80-year-old man presented to the emergency department with a self-removed nephrostomy catheter. The patient had inserted left PCN for the management of hydronephrosis induced by lower ureteral stricture 2 years ago, but the congestive heart failure accompanied by cerebral aneurysm prevented radical surgery, resulting in a long-term indwelling of PCN with routine change per 3 month bases as an alternative way to preserve his renal function. Considering well-matured nephrostomy tract also with the intention to evade needless medical cost, re-insertion of nephrostomy catheter was attempted solely under the guidance of safety-wire without fluoroscopic monitoring. At first, in a right decubitus position, a soft-end of guidewire was carefully inserted via nephrostomy site. After advancement of 10 cm extent, however, further advancements were blocked by resistance. Thus, a gentle interpose of guidewire was tried, result in a sufficient insertion to introduce a catheter. However, at the moment of applying a catheter through the guidewire, brisk venous-appearing blood was drained. Within 10 minutes, a massive hemorrhage of approximately 800 ml was present, led to the suspicion of the major vascular injury. The catheter was sustained instead of to be removed to prevent additional damage following by immediate maintenance care including double intravenous and central lining. While hemoglobin level and blood pressure were sharply dropped from 10 g/dl to 5.0 g/dl and to 80/50 mmHg, respectively, after prompt drop infusion of fluid and transfusion of whole blood, vital signs were gradually

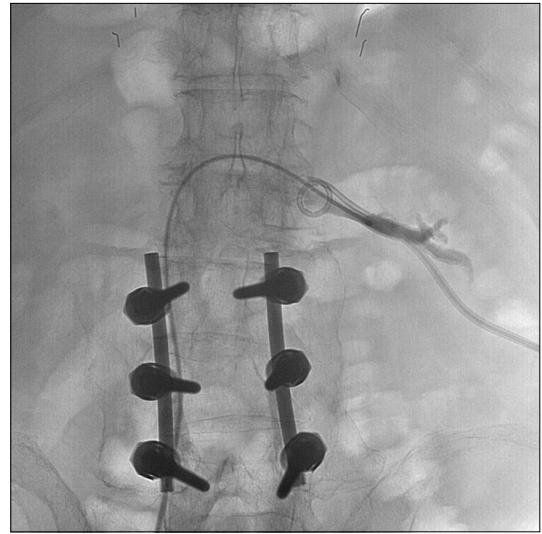


Fig. 2. Initial venography taken 72 hours after percutaneous nephrostomy catheter insertion.

stabilized. A CT image which was taken in 6 hour after attempt of insertion revealed the nephrostomy catheter located within left renal vein (Fig. 1).

After 72 hours, when stabilized vital signs were maintained with conservative management, venography on the left renal vein was performed through the right femoral vein to investigate the opportunity for minimal-invasive approach (Fig. 2). Though the image showed extravasation, given a small volume of leak of contrast media, a careful attempt to removal of the nephrostomy catheter was tried 120 hours after nephrostomy insertion, under venography monitoring (Fig. 3). To minimize additional injury from the terminal angled loop of PCN catheter, additional soft guide wire was placed in the catheter prior to removal (Fig. 4). Right after removal of the catheter, the serial venography revealed the renal pelvis filled with contrast media (Fig. 5). Under the monitoring of fluoroscopy, a new PCN catheter was safely placed within the renal pelvis. After procedure, the patient kept bed rest status for 3 days, then discharged at 10 days after initial PCN change trial. And no adverse events observed during 48 months, per three months basis of follow up.

DISCUSSION

Traditionally, PCN has been performed as an inpatient procedure. After the procedure, the patient is usually kept in the hospital overnight for observation. While most experts

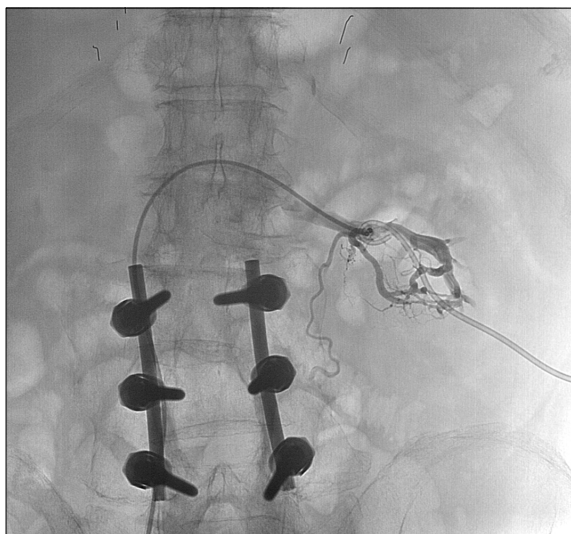


Fig. 3. Follow up venography taken 120 hours after percutaneous nephrostomy catheter insertion showed the catheter located near the bifurcation of renal vein.

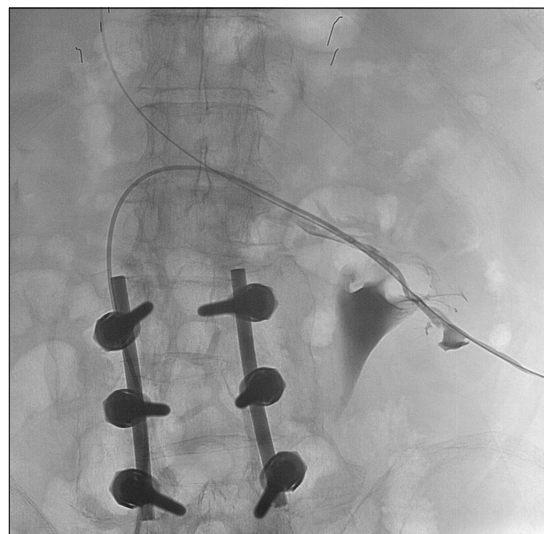


Fig. 5. The venography right after removal of the percutaneous nephrostomy catheter revealed the renal pelvis filled with contrast media.

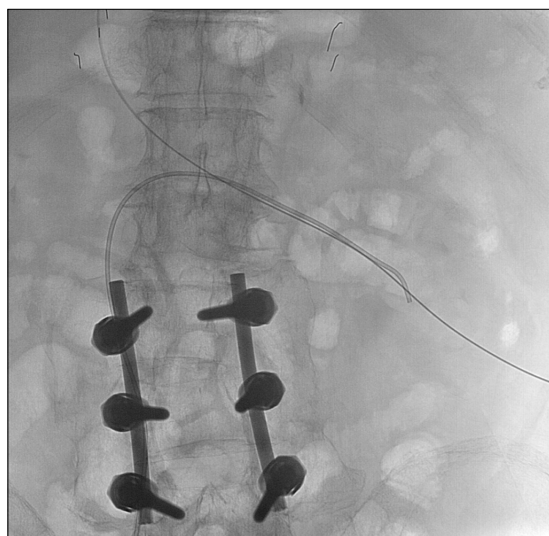


Fig. 4. Additional soft guide wire was placed in the catheter prior to removal to minimize additional injury from the terminal angled loop of percutaneous nephrostomy catheter.

consider PCN to be an inpatient procedure, we have been asked to perform a PCN only with fluoroscopic guidance on an outpatient basis, for a variety of reasons, especially in replacement of PCN catheter.³

PCN is classically described as being performed under radiologic guidance. Firstly, under the ultrasonographic guidance, a needle was penetrated into the renal pelvis through the renal parenchyme and lower calyx and then the guide wire was inserted. Then, fluoroscopy has been

used to place the final catheter with the guidewire exchange technique. However, occasionally, when there is a contrast extravasation, fluoroscopic or ultrasonographic documentation of final catheter position is difficult.⁴ In these cases with suspected malpositioned nephrostomy catheters, CT confirmed the location of the nephrostomy catheter with respect to the renal pelvis and was useful in delineating the route of the catheter through the kidney and the renal collecting system. Thus, CT was very useful in displaying catheter position when there was extravasation of contrast, which made fluoroscopic or ultrasonographic assessment of final catheter position difficult.⁵

Although PCN is a widely accepted and a relatively safe procedure, potentially serious complications may occur, including severe bleeding, septicemia, and injury to adjacent organs.⁶ In 1982, Stables⁷ reported a total complication rate of 4% in a study. Of these 1.3% were related to hemorrhage and only 0.2% were fatal. Another study showed that the overall complication rate was 6.5% and the rate of hemorrhage requiring blood transfusion was 2.8%.⁸ Hemorrhage following PCN is unusually related to injury of the renal vessel.⁹ Injury to the renal vein owing to PCN, especially replacement of PCN catheter, is very rare. We experienced a case of rare complication that a nephrostomy catheter was penetrated into the left renal vein during replacement of PCN catheter. The vein has a thinner vascular wall as compared with the artery, which is therefore highly

vulnerable to the perforation. In particular, the left renal vein is long and thick. And the introductory direction via the inferior vena cava can be obscurely differentiated from the route of left ureter. Accordingly in cases in which attempts were made to insert a guide wire only with the help of fluoroscopy, although rare, there is a possibility that a nephrostomy catheter might be incorrectly placed via a renal vein.

The management of renal vein injury using a variety of balloon catheter was described previously.¹⁰ However, those cases involved prolonged balloon inflation and risked pressure necrosis.¹⁰ This case demonstrates that despite perforation into the major renal vein, control of the hemorrhage could be achieved with clamping the nephrostomy catheter using venography monitoring, and laparotomy could be avoided.

Conclusively, although nephrocutaneous fistula was well formed by prolonged catheterization, blind procedure without fluoroscopic monitoring may be the cause of this situation. It is best to handle and manipulate the equipment delicately and with great care under a proper radiologic guidance to avoid such a problem, although time and money consuming.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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